

## Claims

- 1) Nucleic acid encoding a 59.8 kD *Ornithobacterium rhinotracheale* protein or a part of said nucleic acid that encodes an immunogenic fragment of said protein, said nucleic acid or said part thereof having at least 80 % homology with the nucleic acid of the *Ornithobacterium rhinotracheale* protein gene as depicted in SEQ ID NO: 1.
- 2) Nucleic acid or part thereof according to claim 1, characterized in that the sequence has at least 85 %, preferably 90 %, more preferably 95 % homology with the nucleic acid of the *Ornithobacterium rhinotracheale* protein gene as depicted in SEQ ID NO: 1.
- 3) Nucleic acid encoding a 58.2 kD *Ornithobacterium rhinotracheale* protein or a part of said nucleic acid that encodes an immunogenic fragment of said protein, said nucleic acid or said part thereof having at least 80 % homology with the nucleic acid of the *Ornithobacterium rhinotracheale* protein gene as depicted in SEQ ID NO: 3.
- 4) Nucleic acid or part thereof according to claim 3, characterized in that the sequence has at least 85 %, preferably 90 %, more preferably 95 % homology with the nucleic acid of the *Ornithobacterium rhinotracheale* protein gene as depicted in SEQ ID NO: 3.
- 5) Nucleic acid encoding a 46.0 kD *Ornithobacterium rhinotracheale* protein or a part of said nucleic acid that encodes an immunogenic fragment of said protein, said nucleic acid or said part thereof having at least 80 % homology with the nucleic acid of the *Ornithobacterium rhinotracheale* protein gene as depicted in SEQ ID NO: 5.
- 6) Nucleic acid or part thereof according to claim 5, characterized in that the sequence has at least 85 %, preferably 90 %, more preferably 95 % homology with the nucleic acid of the *Ornithobacterium rhinotracheale* protein gene as depicted in SEQ ID NO: 5.
- 7) Nucleic acid encoding a 37.2 kD *Ornithobacterium rhinotracheale* protein or a part of said nucleic acid that encodes an immunogenic fragment of said protein, said nucleic acid or said part thereof having at least 80 % homology with the nucleic acid of the *Ornithobacterium rhinotracheale* protein gene as depicted in SEQ ID NO: 7.
- 8) Nucleic acid or part thereof according to claim 7, characterized in that the sequence has at least 85 %, preferably 90 %, more preferably 95 % homology with the nucleic acid of the *Ornithobacterium rhinotracheale* protein gene as depicted in SEQ ID NO: 7.
- 9) Nucleic acid encoding a 45.6 kD *Ornithobacterium rhinotracheale* protein or a part of said nucleic acid that encodes an immunogenic fragment of said protein, said

nucleic acid or said part thereof having at least 80 % homology with the nucleic acid of the *Ornithobacterium rhinotracheale* protein gene as depicted in SEQ ID NO: 9.

- 10) Nucleic acid or part thereof according to claim 9, characterized in that the sequence has at least 85 %, preferably 90 %, more preferably 95 % homology with the nucleic acid of the *Ornithobacterium rhinotracheale* protein gene as depicted in SEQ ID NO: 9.
- 11) Nucleic acid encoding a 42.2 kD *Ornithobacterium rhinotracheale* protein or a part of said nucleic acid that encodes an immunogenic fragment of said protein, said nucleic acid or said part thereof having at least 80 % homology with the nucleic acid of the *Ornithobacterium rhinotracheale* protein gene as depicted in SEQ ID NO: 11.
- 12) Nucleic acid or part thereof according to claim 11, characterized in that the sequence has at least 85 %, preferably 90 %, more preferably 95 % homology with the nucleic acid of the *Ornithobacterium rhinotracheale* protein gene as depicted in SEQ ID NO: 11.
- 13) Nucleic acid encoding a 34.0 kD *Ornithobacterium rhinotracheale* protein or a part of said nucleic acid that encodes an immunogenic fragment of said protein, said nucleic acid or said part thereof having at least 80 % homology with the nucleic acid of the *Ornithobacterium rhinotracheale* protein gene as depicted in SEQ ID NO: 13.
- 14) Nucleic acid or part thereof according to claim 13, characterized in that the sequence has at least 85 %, preferably 90 %, more preferably 95 % homology with the nucleic acid of the *Ornithobacterium rhinotracheale* protein gene as depicted in SEQ ID NO: 13.
- 15) Nucleic acid encoding a 32.9 kD *Ornithobacterium rhinotracheale* protein or a part of said nucleic acid that encodes an immunogenic fragment of said protein, said nucleic acid or said part thereof having at least 80 % homology with the nucleic acid of the *Ornithobacterium rhinotracheale* protein gene as depicted in SEQ ID NO: 15.
- 16) Nucleic acid or part thereof according to claim 15, characterized in that the sequence has at least 85 %, preferably 90 %, more preferably 95 % homology with the nucleic acid of the *Ornithobacterium rhinotracheale* protein gene as depicted in SEQ ID NO: 15.
- 17) DNA fragment comprising a nucleic acid according to claim 1-16.
- 18) Recombinant DNA molecule comprising a nucleic acid according to claims 1-16 or a DNA fragment according to claim 17, under the control of a functionally linked promoter.
- 19) Live recombinant carrier comprising a nucleic acid according to claims 1-16, a DNA fragment according to claim 17 or a recombinant DNA molecule according to claim 18.

- 20) Host cell comprising a nucleic acid according to claims 1-16, a DNA fragment according to claim 17, a recombinant DNA molecule according to claim 18 or a live recombinant carrier according to claim 19.
- 21) A 59.8 kD *Ornithobacterium rhinotracheale* protein or an immunogenic fragment of said protein, said protein or immunogenic fragment thereof having an amino acid sequence homology of at least 80 % with the amino acid sequence as depicted in SEQ ID NO: 2.
- 22) A *Ornithobacterium rhinotracheale* protein or an immunogenic fragment of said protein, according to claim 21, said protein or immunogenic fragment thereof having an amino acid sequence homology of at least 85 %, preferably 90 %, more preferably 95 % to the amino acid sequence as depicted in SEQ ID NO: 2.
- 23) A 59.8 kD *Ornithobacterium rhinotracheale* protein or an immunogenic fragment thereof, characterized in that it is encoded by a nucleic acid according to claim 1 or 2.
- 24) A 58.2 kD *Ornithobacterium rhinotracheale* protein or an immunogenic fragment of said protein, said protein or immunogenic fragment thereof having an amino acid sequence homology of at least 80 % to the amino acid sequence as depicted in SEQ ID NO: 4.
- 25) A *Ornithobacterium rhinotracheale* protein or an immunogenic fragment of said protein, according to claim 24, said protein or immunogenic fragment thereof having an amino acid sequence homology of at least 85 %, preferably 90 %, more preferably 95 % to the amino acid sequence as depicted in SEQ ID NO: 4.
- 26) A 58.2 kD *Ornithobacterium rhinotracheale* protein or an immunogenic fragment thereof, characterized in that it is encoded by a nucleic acid according to claim 3 or 4.
- 27) A 46.0 kD *Ornithobacterium rhinotracheale* protein or an immunogenic fragment of said protein, said protein or immunogenic fragment thereof having an amino acid sequence homology of at least 80 % with the amino acid sequence as depicted in SEQ ID NO: 6.
- 28) A *Ornithobacterium rhinotracheale* protein or an immunogenic fragment of said protein, according to claim 27, said protein or immunogenic fragment thereof having an amino acid sequence homology of at least 85 %, preferably 90 %, more preferably 95 % to the amino acid sequence as depicted in SEQ ID NO: 6.
- 29) A 46.0 kD *Ornithobacterium rhinotracheale* protein or an immunogenic fragment thereof, characterized in that it is encoded by a nucleic acid according to claim 5 or 6.
- 30) A 37.2 kD *Ornithobacterium rhinotracheale* protein or an immunogenic fragment of said protein, said protein or immunogenic fragment thereof having an amino acid sequence homology of at least 80 % with the amino acid sequence as depicted in SEQ ID NO: 8.

- 31) A *Ornithobacterium rhinotracheale* protein or an immunogenic fragment of said protein, according to claim 30, said protein or immunogenic fragment thereof having an amino acid sequence homology of at least 85 %, preferably 90 %, more preferably 95 % to the amino acid sequence as depicted in SEQ ID NO: 8.
- 32) A 37.2 kD *Ornithobacterium rhinotracheale* protein or an immunogenic fragment thereof, characterized in that it is encoded by a nucleic acid according to claim 7 or 8.
- 33) A 45.6 kD *Ornithobacterium rhinotracheale* protein or an immunogenic fragment of said protein, said protein or immunogenic fragment thereof having an amino acid sequence homology of at least 80 % with the amino acid sequence as depicted in SEQ ID NO: 10.
- 34) A *Ornithobacterium rhinotracheale* protein or an immunogenic fragment of said protein, according to claim 33, said protein or immunogenic fragment thereof having an amino acid sequence homology of at least 85 %, preferably 90 %, more preferably 95 % to the amino acid sequence as depicted in SEQ ID NO: 10.
- 35) A 45.6 kD *Ornithobacterium rhinotracheale* protein or an immunogenic fragment thereof, characterized in that it is encoded by a nucleic acid according to claim 9 or 10.
- 36) A 42.2 kD *Ornithobacterium rhinotracheale* protein or an immunogenic fragment of said protein, said protein or immunogenic fragment thereof having an amino acid sequence homology of at least 80 % with the amino acid sequence as depicted in SEQ ID NO: 12.
- 37) A *Ornithobacterium rhinotracheale* protein or an immunogenic fragment of said protein, according to claim 36, said protein or immunogenic fragment thereof having an amino acid sequence homology of at least 85 %, preferably 90 %, more preferably 95 % to the amino acid sequence as depicted in SEQ ID NO: 12.
- 38) A 42.2 kD *Ornithobacterium rhinotracheale* protein or an immunogenic fragment thereof, characterized in that it is encoded by a nucleic acid according to claim 11 or 12.
- 39) A 34.0 kD *Ornithobacterium rhinotracheale* protein or an immunogenic fragment of said protein, said protein or immunogenic fragment thereof having an amino acid sequence homology of at least 80 % with the amino acid sequence as depicted in SEQ ID NO: 14.
- 40) A *Ornithobacterium rhinotracheale* protein or an immunogenic fragment of said protein, according to claim 39, said protein or immunogenic fragment thereof having an amino acid sequence homology of at least 85 %, preferably 90 %, more preferably 95 % to the amino acid sequence as depicted in SEQ ID NO: 14.

- 41) A 34.0 kD *Ornithobacterium rhinotracheale* protein or an immunogenic fragment thereof, characterized in that it is encoded by a nucleic acid according to claim 13 or 14.
- 42) A 32.9 kD *Ornithobacterium rhinotracheale* protein or an immunogenic fragment of said protein, said protein or immunogenic fragment thereof having an amino acid sequence homology of at least 80 % with the amino acid sequence as depicted in SEQ ID NO: 16.
- 43) A *Ornithobacterium rhinotracheale* protein or an immunogenic fragment of said protein, according to claim 42, said protein or immunogenic fragment thereof having an amino acid sequence homology of at least 85 %, preferably 90 %, more preferably 95 % to the amino acid sequence as depicted in SEQ ID NO: 16.
- 44) A 32.9 kD *Ornithobacterium rhinotracheale* protein or an immunogenic fragment thereof, characterized in that it is encoded by a nucleic acid according to claim 15 or 16.
- 45) A nucleic acid according to claims 1-16, a DNA fragment according to claim 17, a recombinant DNA molecule according to claim 18, a live recombinant carrier according to claim 19, a host cell according to claim 20 or a protein according to claims 21-44 or an immunogenic fragment thereof, for use in a vaccine.
- 46) Use of a nucleic acid according to claims 1-16, a DNA fragment according to claim 17, a recombinant DNA molecule according to claim 18, a live recombinant carrier according to claim 19, a host cell according to claim 20 or a protein according to claims 21-44 or an immunogenic fragment thereof for the manufacturing of a vaccine for combating *Ornithobacterium rhinotracheale* infection.
- 47) Vaccine for combating *Ornithobacterium rhinotracheale* infection, characterized in that it comprises a nucleic acid according to claims 1-16, a DNA fragment according to claim 17, a recombinant DNA molecule according to claim 18, a live recombinant carrier according to claim 19, a host cell according to claim 20 or a protein according to claims 21-44 or an immunogenic fragment thereof, and a pharmaceutically acceptable carrier.
- 48) Vaccine for combating *Ornithobacterium rhinotracheale* infection, characterized in that it comprises antibodies against a protein according to claims 21-44 or an immunogenic fragment of said protein, and a pharmaceutically acceptable carrier.
- 49) Vaccine according to claim 47, characterized in that it comprises an adjuvant.
- 50) Vaccine according to claim 47-49, characterized in that it comprises an additional antigen derived from a virus or micro-organism pathogenic to poultry, an antibody against such an antigen or genetic information encoding said antigen.



- 51) Vaccine according to claim 50, characterized in that said virus or micro-organism pathogenic to chickens is selected from the group consisting of Fowlpox virus, Infectious Bronchitis virus, Infectious Bursal Disease (Gumboro), Marek's Disease Virus, Chicken Anaemia agent, Avian Reovirus, *Mycoplasma gallisepticum*, Turkey Rhinotracheitis virus, *Haemophilus paragallinarum* (Coryza), Chicken Poxvirus, Avian Encephalomyelitisvirus, Duck Plague virus, Newcastle Disease virus, Egg Drop syndrome virus, Infectious Laryngotracheitis virus, Herpes Virus of Turkeys, *Eimeria* species, *Ornithobacterium rhinotracheale*, *Pasteurella multocida*, *Mycoplasma synoviae*, *Salmonella* species and *E. coli*.
- 52) Method for the preparation of a vaccine according to claims 47-51, said method comprising the admixing of a nucleic acid according to claims 1-16, a DNA fragment according to claim 17, a recombinant DNA molecule according to claim 18, a live recombinant carrier according to claim 19, a host cell according to claim 20, a protein according to claims 21-44 or an immunogenic fragment thereof, or antibodies against a protein according to claims 21-44 and a pharmaceutically acceptable carrier.

Express Mail: EV 829030955 US  
Entry into National Stage of PCT/EP2005/050577  
Attorney Docket: I-2004.011 US